LEAG Update

Dr. Samuel Lawrence

For the Lunar Exploration Analysis Group

Planetary Science Advisory Council Meeting
August 2020

LEAG EXECUTIVE COMMITTEE: SEPTEMBER 2020

- LEAG Chair: **Dr. Amy Fagan (Western Carolina University)**
- Emeritus Chair: **Dr. Samuel Lawrence (NASA JSC)**
- Science Chair: **Dr. Brett Denevi (JHU/APL)**
- Human Exploration Chair: **Dr. Kelsey Young (NASA-GSFC)**
- Technology Chair: **Dr. Jose Hurtado (UTEP)**
- Chair, Commercial Advisory Board: **Dr. Elizabeth Frank (First Mode, Inc.)**
- Strategic Policy Chair: **Dr. Lisa Gaddis (USGS Astrogeology)**
- Operations Chair: **Dr. Erica Jawin (Smithsonian Institution)**
- Early Career Representative: **Dr. Sarah Valencia** (UMCP/NASA GSFC)
- Member at-large: **Dr. Ryan Watkins (PSI)**
- Member at-large: **Dr. Benjamin Greenhagen (JHU/APL)**
- Astrophysics/Heliophysics Liaison: TBD
- EDI Chair: TBD

- Ex Officio Members
  - Dr. Sarah Noble (HQ-SMD, PSD) [NASA Liaison]
  - Dr. Brad Bailey, HQ-SMD/ESSIO
  - Dr. Jake Bleacher, HEOMD
  - Andy Petro, NASA HQ, SCAN
  - Greg Schmidt, SSERVI director
  - Dr. Allan Treiman, LPI Director (acting)

LEAG ACTIVITIES

- LEAG/SSERVI Virtual Symposium on future missions and instrument concepts – Feb. 7, 2020
  - https://www.youtube.com/watch?v=1bspn_u6B3Y&list=PLKg3EyXg9Sjpq0_MrZ_KrNV4wKuiAiUQH
- LEAG/SSERVI Virtual Symposium on Preparing for the Decadal Survey – May 22, 2020
  - https://www.youtube.com/watch?v=KKaDMiIPYX4&list=PLKg3EyXg9SjoXoe2T2IzUzPsZ2NDPzLGn
- ***Thank you*** PSD for helping with issues relating to lunar sample studies as they pertain to EW and SSW!

- Overwhelming community interest in the Lunar Surface Science Workshop series
  - >1300 Total Attendees for all of the LSSW Sessions!
- Planetary Science and Astrobiology Decadal Survey
  - 27 Whitepapers (so far)
- New Views of the Moon 2 chapters being reviewed

COSPAR RAPID RESPONSE SPECIAL ACTION TEAM

Background

- SAT requested by Planetary Science Division – limited duration 2-week scope
- Answer aeries of questions provided to NASA by COSPAR related to science implications of lunar planetary protection
- https://www.lpi.usra.edu/leag/reports/COSPARRRSAT_v2.pdf
- 2-Tiered Rapid Response SAT
  - Tier 1: Targeted expert inputs
  - Tier 2: General community Response

Outcomes

- *"…human activities on the lunar surface are unavoidable, and solutions that outright preclude surface exploration and resource extraction are both infeasible and undesirable.* ***A clear theme of the SAT responses is the inarguable need for a pragmatic balance between exploration objectives, economic development, and narrow scientific goals."***

VOLATILE VIABILITY MEASUREMENT SPECIAL ACTION TEAM [VVM-SAT]

Background

- LEAG SAT chartered by DAAX, Science Mission Directorate
- Goal was to assess the abilities of existing instruments to achieve Decadal priorities in the context of a lunar polar campaign to understand the composition and origin of volatile species.

Outcomes

- *The committee concluded that **significant, meaningful progress may be made against high-priority lunar science goals by deploying flight-heritage instruments on the lunar surface.***

LEAG AUGUST FINDING: WHITEPAPER DEADLINES

- The LEAG community thanks the National Academy for adjusting the white paper deadlines for the Planetary Science and Astrobiology Decadal Survey, a welcome reflection of the challenges we as a community are all facing in this difficult time.

LEAG AUGUST FINDING: LDEP PROGRAM

- **The SMD/ESSIO Lunar Discovery and Exploration Program is critical for addressing planetary science priorities, growing a bold new American industry, and developing the next generation of planetary scientists with regular flight opportunities as part of an integrated lunar exploration campaign.**
  - It has our strongest possible support and deserves budgetary support commensurate with growing capability to achieve Discovery and New Frontiers-level science
  - PRISM is the promising start of an innovative model for achieving planetary science goals and a good vehicle for achieving cross-directorate/discipline goals
  - Many US-LER goals cross-cut exploration and technology domains in NASA (e.g., ISRU, resource prospecting) and LEAG encourages ESSIO to take the lead in developing an integrated campaign to achieve science, exploration, and technology objectives for lunar surface exploration as part of an integrated campaign.
  - LEAG strongly supports Trailblazer, which is a promising addition to current lunar mission portfolio
  - We should start the conversation of how to capture the capabilities of a "next-gen" LRO
  - See CAB findings

LEAG AUGUST FINDING: ARTEMIS

- **The Artemis Program is vital for achieving paradigm-shifting advances across a variety of scientific disciplines.**
- The recently-released Artemis program scientific objectives – the **Bold New Era of Human Discovery** –reflect high-priority planetary science goals that have been comprehensively vetted through community documents including multiple Decadal surveys, the SCEM report, and the LEAG Lunar Exploration Roadmap. **Through the combination of orbital, lander, robotic, and human exploration, Artemis will considerably advance or even completely redefine Decadal science objectives.**
  - Lunar Surface Science Workshops have been a valuable way for the community to give input about how to maximize the science return of Artemis, and LEAG encourages NASA to continue to provide these opportunities for community input, which are key for maintaining and growing community investment in this great enterprise

LEAG AUGUST FINDING: VIPER

- **LEAG is pleased to see the progress being made on the VIPER mission, as demonstrated by the recent selection through a competitive process of the delivery lander.**
  - VIPER is the key first step of a campaign to assess the vast resource potential of the Moon while addressing key science questions relating to the origin and distribution of volatile species in the lunar polar regions in a uniquely synergistic fashion.
  - The LRO mission vividly demonstrates that planetary scientists are the trailblazers for human exploration, and it's good to see PSD once again leading the way towards a bold new era of human discovery
  - VIPER is an excellent example of the innovation inherent in the CLPS model and the potential benefits to the entire planetary community fostered by a healthy competition between providers
  - LEAG strongly encourages the participating scientist program for the VIPER mission.

LEAG AUGUST FINDING: KPLO PSP

- LEAG has previously issued findings that strongly supported the NASA KPLO Participating Scientist program, and proposals were solicited early last year for the program. LEAG continues to strongly support the NASA KPLO PS program, and requests an update as to its current status.

LEAG AUGUST FINDINGS: SUSTAINABILITY

- **LEAG welcomes the release of the NASA Plan for Lunar Sustainability. There is enormous societal and scientific value to a permanent American presence on the surface of the Moon.**
  - The Artemis Base Camp – meaning, the stationary Foundational Habitat and associated surface infrastructure outlined in the Sustainability Plan – will redefine Solar System exploration while fostering the involvement of commercial partners in space exploration toward establishing an enduring human foothold on another planetary surface for the first time – a stunning achievement for humanity.
- Sustainability requires commercial activities, and achieving our science priorities across the solar system in a cost-constrained environment will benefit greatly from a thriving cis-lunar economy.

LEAG COMMERCIAL ADVISORY BOARD FINDING C1

- **Finding C1:** The **CAB supports an integrated campaign approach to lunar exploration** including prospecting, orbiters, surface science, and sample return.

- **Background**: Discussion at the LEAG meeting indicated the need for data derived from several sources. While we need mobile surface prospectors for resources, there is still a need for orbital data, in addition to surface science and sample return to achieve the science and exploration objectives outlined in several documents such as the 2016 LEAG Lunar Exploration Roadmap and the 2007 NRC SCEM report. An integrated campaign will enable progress to be made relatively rapidly.

LEAG COMMERCIAL ADVISORY BOARD FINDING C2

- **Finding C2:** The CAB finds that a sustainable cis-lunar economy requires sustaining CLPS providers and other companies that are building up internal infrastructure, staff, and institutional knowledge. NASA can address this by expanding the number of funding opportunities available to commercial companies across all NASA directorates.

- **Implementation Suggestions**:
  - Expanding CLPS to include surface mobility (e.g., rovers, hoppers, etc.) and orbiters (cube-satellites and larger).
  - Adding language to the SIMPLEx call to encourage commercial partnership.
  - Procurement opportunities for service-based lunar infrastructure (e.g., power, communication, navigation, etc.).

- https://www.hou.usra.edu/meetings/leag2020/
- Virtual Meeting September 14-16 2020
- **Theme: The Value of a Sustained Human Presence at the Artemis Base Camp**
- All kinds of innovations to make Virtual Meetings more ‘fun’ and use the community’s valuable time most wisely


ONLY A FEW DAYS
AWAY IS A
STUNNING WORLD
FULL OF WONDER
AND OPPORTUNITY
WAITING FOR US